CLAIMS

1. A system configured to implement a failover in scheduling services, the system comprising:

server apparatuses each comprising a processing unit and a memory unit,

wherein the system is configured to obtain a task to be executed and to associate the task with a label from which requirements of the task is identifiable,

wherein the processing unit and the memory unit of each server apparatus are co-operable to configure the server apparatus as a service node capable of obtaining the task, and

wherein the server apparatuses are configured to enter a competition mode in which the server apparatuses compete for the label, and one of the server apparatuses, which matches the requirements, obtains and holds the label, and converts from the service node to a target service node to execute the task,

and if an exception happens to occur in the target service node, the server apparatus operating as the target service node is configured to release the label to idling server apparatuses to compete for the label, avoiding any unnecessary repetition and/or delay from the server apparatuses in executing the task,

and further comprising:

an internal event trigger mechanism which commences the competition mode, wherein the internal event trigger mechanism comprises one or more of the server apparatuses configured to first identify an input, recognize the task from the input, and set off the internal event trigger mechanism, so as to have the server apparatuses enter the competition mode.

2. The system of claim 1,

wherein the processing unit of the server apparatus operating as the target service node writes an identification information into the label held by the server apparatus to generate a held label, wherein the identification information contains an identity of the server apparatus holding the label,

and

another server apparatus, which happens to obtain the held label, is configured not to execute the task corresponding to the held label.

3. The system of claim 2,

wherein the processing unit of the server apparatus operating as the target service node, based on a pre-defined interval, writes a usage time for holding the label and aggregates the usage time written to periodically generate a heartbeat information,

wherein the heartbeat information is written into the label or the held label, and

wherein the heartbeat information is stored in (i) the memory unit of the server apparatus operating as the target service node and (ii) the label or the held label.

4. The system of claim 3,

wherein the processing unit of the server apparatus operating as the target service node renders a signal identifying the heartbeat information is not updated for a period that exceeds a threshold defined by the system and/or a user, and

wherein the server apparatus operating as the target service node is configured to release the held label and the idling server apparatuses then compete for the label.

5. The system of claim 4, wherein one of the idling server apparatuses successfully competes for the label, obtains and holds the label, and converts from a service node to a target service node to (i) continue execution of the task or (ii) execute the task from start of the task.

6. The system of any one of claims 1 to 5, wherein the exception comprises:

a disconnection of the server apparatus operating as the target service node from the system; and/or

a hardware failure in the server apparatus operating as the target service node; and/or

a software error in the server apparatus operating as the target service node; and/or

insufficient resources in the server apparatus operating as the target service node.

7. The system of any one of claims 1 to 6, wherein the system is configured to:

(i) obtain a number of tasks to be processed,

(ii) identify a number of the server apparatuses available as service nodes; and

(iii) compare the number of tasks with the number of the server apparatuses which are available as service nodes so as to operate with a sufficient number of the server apparatuses available as service nodes to commence the competition mode, wherein the sufficient number comprises any number of server apparatuses more than the number of tasks but avoids a larger number of idling server apparatuses.

8, The system of claim 4,

wherein each server apparatus configured as a service node is operable as a monitoring node, wherein the server apparatus obtains a distribution lock pre-set in the system, wherein the distribution lock renders the server apparatus to switch from the service node to the monitoring node which is configured to monitor if the heartbeat information is updated, and if the heartbeat information is not updated for a period exceeding the threshold defined by the system and/or the user, the server apparatus operating as the monitoring node renders the signal, informing the exception occurred;

or

further comprising server apparatuses each configured as a monitoring node, which is configured to monitor if the heartbeat information is updated, and if the heartbeat information is not updated for a period exceeding the threshold defined by the system and/or the user, each server apparatus operating as the monitoring node renders the signal, informing the exception occurred.

9. The system of claim 1, wherein the server apparatus operating as the target service node is configured to check, prior to executing the task:

(i) if the server apparatus previously obtained and is still holding a prior label, and if the server apparatus is still holding the prior label, then the server apparatus proceeds to execute the task associated with the prior label; and

(ii) if the server apparatus is idling and holds no prior label, then the server apparatus avoids executing the task associated with the prior label.

10. The system of claim 1 or 2, wherein the server apparatus operating as the service node successfully competes for the label and before converting to the target service node, checks if any prior identification information is written into the label to be obtained by the server apparatus, and if no prior identification information was written into the label, the server apparatus converts from the service node to the target service node and the processing unit of the server apparatus operating as the target service node writes an identification information into the label.

11. A method for implementing a failover in a system configured to schedule services, the method comprising:

obtaining a task by the system;

associating the task with a label from which requirements of the task is identifiable;

entering a competition mode in which server apparatuses compete for the label, wherein one of the server apparatuses, which matches the requirements, obtains the label and holds the label;

converting the server apparatus that obtained and is holding the label from a service node to a target service node to execute the task;

and

if an exception happens to occur in the target service node, releasing the label from the server apparatus operating as the target service node to idling server apparatuses to compete for the label, avoiding any unnecessary repetition and/or delay from the server apparatuses in executing the task,

and further comprising:

configuring one or more of the server apparatuses to first identify an input, recognize the task from the input, and then set off an internal event trigger mechanism, so as to have the server apparatuses enter the competition mode, wherein the internal event trigger mechanism commences the competition mode.

12. The method of claim 11, further comprising:

writing an identification information into the label held by the server apparatus operating as the target service node to generate a held label which prevents another server apparatus from executing the task corresponding to the held label, wherein the identification information contains an identity of the server apparatus holding the label.

13. The method of claim 12, further comprising:

writing a usage time for holding the label into the label or the held label;

aggregating the usage time written to periodically generate a heartbeat information; and

storing the heartbeat information in the (i) memory unit of the server apparatus operating as the target service node and (ii) the label or the held label.

14. The method of claim 13, further comprising:

rendering a signal identifying the heartbeat information not being updated for a period that exceeds a threshold defined by the system and/or a user, and

releasing the held label by the server apparatus operating as the target service node to allow the idling server apparatuses to then compete for the label.

15. The method of claim 14, further comprising:

(i) continuing execution of the task by one of the idling server apparatuses which successfully competed, obtained, and holds the label, and converted from a service node to a target service node;

or

(ii) executing the task from start of the task by one of the idling server apparatuses which successfully competed, obtained, and holds the label, and converted from a service node to a target service node.

16. The method of any one of claims 11 to 15, wherein the exception comprises:

a disconnection of the server apparatus operating as the target service node from the system; and/or

a hardware failure in the server apparatus operating as the target service node; and/or

a software error in the server apparatus operating as the target service node; and/or

insufficient resources in the server apparatus operating as the target service node.

17. The method of any one of claims 11 to 17, further comprising:

(i) configuring a number of tasks to be processed and the system to obtain the number of tasks;

(ii) configuring the system to identify a number of the server apparatuses available as service nodes; and

(iii) configuring the system to compare the number of tasks with the number of the server apparatuses available as service nodes so as to operate with a sufficient number of the server apparatuses available as service nodes to commence the competition mode, wherein the sufficient number comprises any number of server apparatuses more than the number of tasks but avoids a larger number of idling server apparatuses.

18. The method of claim 14, further comprising:

obtaining a distribution lock pre-set in a system, wherein the server apparatus that obtains the distribution lock switches from the service node to a monitoring node which is configured to monitor if the heartbeat information is updated, and

if the heartbeat information is not updated for a period exceeding the threshold defined by the system and/or the user, rendering, by the server apparatus operating as the monitoring node, the signal to inform the exception occurred;

or

monitoring if the heartbeat information is updated by server apparatuses configured as a monitoring node, and

if the heartbeat information is not updated for a period exceeding the threshold defined by the system and/or the user, rendering, by the server apparatus operating as the monitoring node, the signal to inform the exception occurred.

19. The method of claim 11, further comprising:

configuring the server apparatus operating as the target service node to check, prior to executing the task:

(i) if the server apparatus previously obtained and is still holding a prior label, and if the server apparatus is still holding the prior label, then proceeding to execute the task associated with the prior label by the server apparatus; and

(ii) if the server apparatus is idling and holds no prior label, then avoiding execution of the task associated with the prior label by the server apparatus.

20. The method of claim 11 or 12, further comprising:

checking, by the server apparatus operating as the service node which successfully competed for the label and before converting to the target service node, if any prior identification information is written into the label to be obtained by the server apparatus; and

writing an identification information into the label by the processing unit of the server apparatus that converts from the service node to the target service node.